EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	0	isoxaben resistant cellulose synthase	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	ADJ	ON	2006/07/31 15:13
L2	566	cellulose synthase	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	ADJ	ON	2006/07/31 15:13
L3	36	L2 and @py<"2000"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	ADJ	ON	2006/07/31 15:17
L4	2	modified cellulose synthase	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	ADJ	ON	2006/07/31 15:19
L5	419	cellulose synthase and arabidopsis	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	ADJ	ON	2006/07/31 15:20
L6	10	l5 and @py<"2001"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	ADJ	ON	2006/07/31 15:22
L7	50	l5 and @py<"2003"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	ADJ	ON	2006/07/31 15:23
L8	110	l5 and @py<"2004"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	ADJ	ON	2006/07/31 15:23
L9	887	somerville$.in.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	ADJ	ON	2006/07/31 15:24

EAST Search History

L10	1	L9 and cellulose synthase	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	ADJ	ON	2006/07/31 15:25
L11	24	L9 and arabidopsis	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	ADJ	ON	2006/07/31 15:26
L12	0	mutant cellulose synthase	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	ADJ	ON	2006/07/31 15:27
L13	471	mutant and cellulose synthase	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	ADJ	ON	2006/07/31 15:27
L14	65	l13 and @py<"2003"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	ADJ	ON	2006/07/31 15:28

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=> s celluose synthase and mutant
L1            0 CELLUOSE SYNTHASE AND MUTANT

=> s cellulose synthase
L2         1735 CELLULOSE SYNTHASE

=> s l2 and py<2001
   1 FILES SEARCHED...
   6 FILES SEARCHED...
L3          670 L2 AND PY<2001

=> s l3 and mutant?
L4          121 L3 AND MUTANT?

=> dup rem l4
PROCESSING COMPLETED FOR L4
L5           29 DUP REM L4 (92 DUPLICATES REMOVED)
                ANSWERS '1-13' FROM FILE MEDLINE
                ANSWER '14' FROM FILE AGRICOLA
                ANSWER '15' FROM FILE JICST-EPLUS
                ANSWERS '16-18' FROM FILE CABA
                ANSWER '19' FROM FILE BIOTECHNO
                ANSWERS '20-26' FROM FILE CAPLUS
                ANSWER '27' FROM FILE LIFESCI
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ANSWERS '28-29' FROM FILE SCISEARCH

=> d his

(FILE 'HOME' ENTERED AT 16:18:15 ON 31 JUL 2006)

FILE 'MEDLINE, AGRICOLA, DRUGU, JICST-EPLUS, CABA, BIOTECHNO, BIOSIS, CAPLUS, LIFESCI, BIOTECHDS, EMBASE, BIOENG, SCISEARCH' ENTERED AT 16:18:34 ON 31 JUL 2006

L1 0 S CELLUOSE SYNTHASE AND MUTANT
L2 1735 S CELLULOSE SYNTHASE
L3 670 S L2 AND PY<2001
L4 121 S L3 AND MUTANT?
L5 29 DUP REM L4 (92 DUPLICATES REMOVED)

=> d l5 ibib abs total

L5 ANSWER 1 OF 29 MEDLINE on STN DUPLICATE 1
ACCESSION NUMBER: 2001483417 MEDLINE
DOCUMENT NUMBER: PubMed ID: 11178255
TITLE: Higher plant cellulose synthases.
AUTHOR: Richmond T
CORPORATE SOURCE: Department of Plant Biology, Carnegie Institution of Washington, 260 Panama Street, Stanford, CA 94305, USA.. todd@andrew2.stanford.edu
SOURCE: Genome biology, (2000) Vol. 1, No. 4, pp. REVIEWS3001. Electronic Publication: 2000-10-13. Ref: 12 Journal code: 100960660. E-ISSN: 1465-6914.
PUB. COUNTRY: England: United Kingdom
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
General Review; (REVIEW)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 200108
ENTRY DATE: Entered STN: 3 Sep 2001
Last Updated on STN: 5 Jan 2003
Entered Medline: 30 Aug 2001

AB SUMMARY: Cellulose, an aggregate of unbranched polymers of beta-1,4-linked glucose residues, is the major component of wood and thus paper, and is synthesized by plants, most algae, some bacteria and fungi, and even some animals. The genes that synthesize cellulose in higher plants differ greatly from the well-characterized genes found in Acetobacter and Agrobacterium sp. More correctly designated as 'cellulose synthase catalytic subunits', plant cellulose synthase (CesA) proteins are integral membrane proteins, approximately 1,000 amino acids in length. The sequences for more than 20 full-length CesA genes are available, and they show high similarity to one another across the entire length of the encoded protein, except for two small regions of variability. There are a number of highly conserved residues, including several motifs shown to be necessary for processive glycosyltransferase activity. No crystal structure is known for cellulose synthase proteins, and the exact enzymatic mechanism is unknown. There are a number of mutations in cellulose synthase genes in the model organism Arabidopsis thaliana. Some of these mutants show altered morphology due to the lack of a properly developed primary or secondary cell wall. Others show resistance to well-characterized cellulose biosynthesis inhibitors.

L5 ANSWER 2 OF 29 MEDLINE on STN DUPLICATE 2
ACCESSION NUMBER: 2001140511 MEDLINE
DOCUMENT NUMBER: PubMed ID: 11148295
TITLE: Multiple cellulose synthase catalytic

subunits are required for cellulose synthesis in Arabidopsis.
AUTHOR: Taylor N G; Laurie S; Turner S R
CORPORATE SOURCE: School of Biological Sciences, University of Manchester, Manchester, M13 9PT, United Kingdom.
SOURCE: The Plant cell, (2000 Dec) Vol. 12, No. 12, pp. 2529-2540.
Journal code: 9208688. ISSN: 1040-4651.
PUB. COUNTRY: United States
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 200103
ENTRY DATE: Entered STN: 4 Apr 2001
Last Updated on STN: 4 Apr 2001
Entered Medline: 8 Mar 2001

AB The irregular xylem 1 (irx1) mutant of Arabidopsis has a severe deficiency in the deposition of cellulose in secondary cell walls, which results in collapsed xylem cells. This mutation has been mapped to a 140-kb region of chromosome 4. A cellulose synthase catalytic subunit was found to be located in this region, and genomic clones containing this gene complemented the irx1 mutation. IRX1 shows homology to a previously described cellulose synthase (IRX3). Analysis of the irx1 and irx3 mutant phenotypes demonstrates that both IRX1 and IRX3 are essential for the production of cellulose in the same cell. Thus, IRX1 and IRX3 define distinct classes of catalytic subunits that are both essential for cellulose synthesis in plants. This finding is supported by coprecipitation of IRX1 with IRX3, suggesting that IRX1 and IRX3 are part of the same complex.

L5 ANSWER 3 OF 29 MEDLINE on STN DUPLICATE 3
ACCESSION NUMBER: 2001140503 MEDLINE
DOCUMENT NUMBER: PubMed ID: 11148287
TITLE: PROCUSTE1 encodes a cellulose synthase required for normal cell elongation specifically in roots and dark-grown hypocotyls of Arabidopsis.
AUTHOR: Fagard M; Desnos T; Desprez T; Goubet F; Refregier G; Mouille G; McCann M; Rayon C; Vernhettes S; Hofte H
CORPORATE SOURCE: Laboratoire de Biologie Cellulaire, Institut National de la Recherche Agronomique, 78026 Versailles Cedex, France.
SOURCE: The Plant cell, (2000 Dec) Vol. 12, No. 12, pp. 2409-2424.
Journal code: 9208688. ISSN: 1040-4651.
PUB. COUNTRY: United States
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 200103
ENTRY DATE: Entered STN: 4 Apr 2001
Last Updated on STN: 4 Apr 2001
Entered Medline: 8 Mar 2001

AB Mutants at the PROCUSTE1 (PRC1) locus show decreased cell elongation, specifically in roots and dark-grown hypocotyls. Cell elongation defects are correlated with a cellulose deficiency and the presence of gapped walls. Map-based cloning of PRC1 reveals that it encodes a member (CesA6) of the cellulose synthase catalytic subunit family, of which at least nine other members exist in Arabidopsis. Mutations in another family member, RSW1 (CesA1), cause similar cell wall defects in all cell types, including those in hypocotyls and roots, suggesting that cellulose synthesis in these organs requires the coordinated expression of at least two distinct cellulose synthase isoforms.

L5 ANSWER 4 OF 29 MEDLINE on STN DUPLICATE 4
ACCESSION NUMBER: 2000160962 MEDLINE
DOCUMENT NUMBER: PubMed ID: 10681463
TITLE: The cellulose synthase gene of Dictyostelium.
AUTHOR: Blanton R L; Fuller D; Iranfar N; Grimson M J; Loomis W F
CORPORATE SOURCE: Department of Biological Sciences, Texas Tech University, Lubbock, TX 79409, USA.. brrlb@ttu.edu
CONTRACT NUMBER: HD30892 (NICHD)
SOURCE: Proceedings of the National Academy of Sciences of the United States of America, (2000 Feb 29) Vol. 97, No. 5, pp. 2391-6.
Journal code: 7505876. ISSN: 0027-8424.
PUB. COUNTRY: United States
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
OTHER SOURCE: GENBANK-AF163835
ENTRY MONTH: 200004
ENTRY DATE: Entered STN: 21 Apr 2000
Last Updated on STN: 21 Apr 2000
Entered Medline: 11 Apr 2000

AB Cellulose is a major component of the extracellular matrices formed during development of the social amoeba, Dictyostelium discoideum. We isolated insertional mutants that failed to accumulate cellulose and had no cellulose synthase activity at any stage of development. Development proceeded normally in the null mutants up to the beginning of stalk formation, at which point the culminating structures collapsed onto themselves, then proceeded to attempt culmination again. No spores or stalk cells were ever made in the mutants, with all cells eventually lysing. The predicted product of the disrupted gene (dcsA) showed significant similarity to the catalytic subunit of cellulose synthases found in bacteria. Enzyme activity and normal development were recovered in strains transformed with a construct expressing the intact dcsA gene. Growing amoebae carrying the construct accumulated the protein product of dcsA, but did not make cellulose until they had developed for at least 10 hr. These studies show directly that the product of dcsA is necessary, but not sufficient, for synthesis of cellulose.

L5 ANSWER 5 OF 29 MEDLINE on STN DUPLICATE 5
ACCESSION NUMBER: 2000498096 MEDLINE
DOCUMENT NUMBER: PubMed ID: 10938350
TITLE: A comparative analysis of the plant cellulose synthase (CesA) gene family.
AUTHOR: Holland N; Holland D; Helentjaris T; Dhugga K S; Xoconostle-Cazares B; Delmer D P
CORPORATE SOURCE: Section of Plant Biology, University of California, Davis, California 95616, USA.
SOURCE: Plant physiology, (2000 Aug) Vol. 123, No. 4, pp. 1313-24.
Journal code: 0401224. ISSN: 0032-0889.
PUB. COUNTRY: United States
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 200010
ENTRY DATE: Entered STN: 27 Oct 2000
Last Updated on STN: 27 Oct 2000
Entered Medline: 18 Oct 2000

AB CesA genes are believed to encode the catalytic subunit of cellulose synthase. Identification of nine distinct CesA cDNAs from maize (Zea mays) has allowed us to initiate comparative

studies with homologs from Arabidopsis and other plant species. Mapping studies show that closely related CesA genes are not clustered but are found at different chromosomal locations in both Arabidopsis and maize. Furthermore, sequence comparisons among the CesA-deduced proteins show that these cluster in groups wherein orthologs are often more similar than paralogs, indicating that different subclasses evolved prior to the divergence of the monocot and dicot lineages. Studies using reverse transcriptase polymerase chain reaction with gene-specific primers for six of the nine maize genes indicate that all genes are expressed to at least some level in all of the organs examined. However, when expression patterns for a few selected genes from maize and Arabidopsis were analyzed in more detail, they were found to be expressed in unique cell types engaged in either primary or secondary wall synthesis. These studies also indicate that amino acid sequence comparisons, at least in some cases, may have value for prediction of such patterns of gene expression. Such analyses begin to provide insights useful for future genetic engineering of cellulose deposition, in that identification of close orthologs across species may prove useful for prediction of patterns of gene expression and may also aid in prediction of mutant combinations that may be necessary to generate severe phenotypes.

L5 ANSWER 6 OF 29 MEDLINE on STN DUPLICATE 6
ACCESSION NUMBER: 2000495760 MEDLINE
DOCUMENT NUMBER: PubMed ID: 10874579
TITLE: Cellulose microfibrils in plants: biosynthesis, deposition, and integration into the cell wall.
AUTHOR: Brett C T
CORPORATE SOURCE: Plant Molecular Science Group, Institute of Biomedical and Life Sciences, University of Glasgow, United Kingdom.
SOURCE: International review of cytology, (2000) Vol. 199, pp. 161-99. Ref: 170
Journal code: 2985180R. ISSN: 0074-7696.
PUB. COUNTRY: United States
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
General Review; (REVIEW)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 200010
ENTRY DATE: Entered STN: 27 Oct 2000
Last Updated on STN: 27 Oct 2000
Entered Medline: 19 Oct 2000

AB Cellulose occurs in all higher plants and some algae, fungi, bacteria, and animals. It forms microfibrils containing the crystalline allomorphs, cellulose I alpha and I beta. Cellulose molecules are 500-15,000 glucose units long. What controls molecular size is unknown. Microfibrils are elongated by particle rosettes in the plasma membrane (cellulose synthase complexes). The precursor, UDP-glucose, may be generated from sucrose at the site of synthesis. The biosynthetic mechanism may involve lipid-linked intermediates. Cellulose synthase has been purified from bacteria, but not from plants. In plants, disrupted cellulose synthase may form callose. Cellulose synthase genes have been isolated from bacteria and plants. Cellulose-deficient mutants have been characterised. The deduced amino acid sequence suggests possible catalytic mechanisms. It is not known whether synthesis occurs at the reducing or nonreducing end. Endoglucanase may play a role in synthesis. Nascent cellulose molecules associate by Van der Waals and hydrogen bonds to form microfibrils. Cortical microtubules control microfibril orientation, thus determining the direction of cell growth. Self-assembly mechanisms may operate. Microfibril integration into the wall occurs by interactions with matrix polymers during microfibril formation.

L5 ANSWER 7 OF 29 MEDLINE on STN DUPLICATE 7

ACCESSION NUMBER: 1999264300 MEDLINE
DOCUMENT NUMBER: PubMed ID: 10330464
TITLE: The irregular xylem3 locus of Arabidopsis encodes a cellulose synthase required for secondary cell wall synthesis.
AUTHOR: Taylor N G; Scheible W R; Cutler S; Somerville C R; Turner S R
CORPORATE SOURCE: University of Manchester, School of Biological Science, Manchester M13 9PT, United Kingdom.
SOURCE: The Plant cell, (1999 May) Vol. 11, No. 5, pp. 769-80.
Journal code: 9208688. ISSN: 1040-4651.
PUB. COUNTRY: United States
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals; Space Life Sciences
OTHER SOURCE: GENBANK-AF088917
ENTRY MONTH: 199907
ENTRY DATE: Entered STN: 30 Jul 1999
Last Updated on STN: 30 Jul 1999
Entered Medline: 22 Jul 1999

AB The irregular xylem3 (irx3) mutant of Arabidopsis has a severe deficiency in secondary cell wall cellulose deposition that leads to collapsed xylem cells. The irx3 mutation has been mapped to the top arm of chromosome V near the marker nga106. Expressed sequence tag clone 75G11, which exhibits sequence similarity to cellulose synthase, was found to be tightly linked to irx3, and genomic clones containing the gene corresponding to clone 75G11 complemented the irx3 mutation. Thus, the IRX3 gene encodes a cellulose synthase component that is specifically required for the synthesis of cellulose in the secondary cell wall. The irx3 mutant allele contains a stop codon that truncates the gene product by 168 amino acids, suggesting that this allele is null. Furthermore, in contrast to radial swelling1 (rsw1) plants, irx3 plants show no increase in the accumulation of beta-1,4-linked glucose in the noncrystalline cell wall fraction. IRX3 and RSW1 fall into a distinct subgroup (Csa) of Arabidopsis genes showing homology to bacterial cellulose synthases.

L5 ANSWER 8 OF 29 MEDLINE on STN DUPLICATE 11
ACCESSION NUMBER: 1998399600 MEDLINE
DOCUMENT NUMBER: PubMed ID: 9729901
TITLE: Increase in the amount of celA1 protein in tobacco BY-2 cells by a cellulose biosynthesis inhibitor, 2,6-dichlorobenzonitrile.
AUTHOR: Nakagawa N; Sakurai N
CORPORATE SOURCE: Faculty of Integrated Arts & Sciences, Hiroshima University, Higashi-Hiroshima, Japan.
SOURCE: Plant & cell physiology, (1998 Jul) Vol. 39, No. 7, pp. 779-85.
Journal code: 9430925. ISSN: 0032-0781.
PUB. COUNTRY: Japan
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 199810
ENTRY DATE: Entered STN: 20 Oct 1998
Last Updated on STN: 20 Oct 1998
Entered Medline: 6 Oct 1998

AB The biochemical analysis of cellulose biosynthesis by plants has been a difficult problem due to the lack of a reliable assay procedure for cellulose synthase activity. Recently, the celA1 gene was cloned from cotton fiber, and this gene was identified from the rsw1 mutant of Arabidopsis as a catalytic subunit of cellulose

synthase (Arioli et al. 1998). The cloning of these genes enables us to obtain specific antibodies against cellulose synthase. A highly specific antibody against celA1 protein was prepared and used to detect the protein from microsomal fraction of tobacco BY-2 cells. The quantity of celA1 protein in microsomal fraction of normal BY-2 cells was under the detection limit, although they contained a large quantity of cellulose. In contrast, cells habituated to 1 microM DCB (a specific inhibitor of cellulose biosynthesis) produced 1/10 of cellulose content of the normal cells, but had much more celA1 protein than the normal cells. The amount of polysaccharides in the EDTA-soluble fraction was relatively increased in habituated cells. The results suggest that celA1 protein is stabilized upon DCB binding and that the crystallization of cellulose microfibrils is inhibited simultaneously.

L5 ANSWER 9 OF 29 MEDLINE on STN DUPLICATE 12
ACCESSION NUMBER: 1998111412 MEDLINE
DOCUMENT NUMBER: PubMed ID: 9445479
TITLE: Molecular analysis of cellulose biosynthesis in Arabidopsis.
AUTHOR: Arioli T; Peng L; Betzner A S; Burn J; Wittke W; Herth W; Camilleri C; Hofte H; Plazinski J; Birch R; Cork A; Glover J; Redmond J; Williamson R E
CORPORATE SOURCE: Cooperative Research Centre for Plant Science, Australian National University, Post Office Box 475, Canberra, ACT 2601, Australia.
SOURCE: Science, (1998 Jan 30) Vol. 279, No. 5351, pp. 717-20.
Journal code: 0404511. ISSN: 0036-8075.
PUB. COUNTRY: United States
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
OTHER SOURCE: GENBANK-AF027172; GENBANK-AF027173; GENBANK-AF027174; GENBANK-AF030052
ENTRY MONTH: 199802
ENTRY DATE: Entered STN: 26 Feb 1998
Last Updated on STN: 3 Mar 2000
Entered Medline: 13 Feb 1998
AB Cellulose, an abundant, crystalline polysaccharide, is central to plant morphogenesis and to many industries. Chemical and ultrastructural analyses together with map-based cloning indicate that the RSW1 locus of Arabidopsis encodes the catalytic subunit of cellulose synthase. The cloned gene complements the rsw1 mutant whose temperature-sensitive allele is changed in one amino acid. The mutant allele causes a specific reduction in cellulose synthesis, accumulation of noncrystalline beta-1,4-glucan, disassembly of cellulose synthase, and widespread morphological abnormalities. Microfibril crystallization may require proper assembly of the RSW1 gene product into synthase complexes whereas glucan biosynthesis per se does not.

L5 ANSWER 10 OF 29 MEDLINE on STN DUPLICATE 16
ACCESSION NUMBER: 95394846 MEDLINE
DOCUMENT NUMBER: PubMed ID: 7665515
TITLE: Identification of a second cellulose synthase gene (acsAII) in Acetobacter xylinum.
AUTHOR: Saxena I M; Brown R M Jr
CORPORATE SOURCE: Department of Botany, University of Texas at Austin 78713-7640, USA.
SOURCE: Journal of bacteriology, (1995 Sep) Vol. 177, No. 18, pp. 5276-83.
Journal code: 2985120R. ISSN: 0021-9193.
PUB. COUNTRY: United States

DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
OTHER SOURCE: GENBANK-U15957
ENTRY MONTH: 199510
ENTRY DATE: Entered STN: 20 Oct 1995
Last Updated on STN: 20 Oct 1995
Entered Medline: 12 Oct 1995

AB A second cellulose synthase gene (acsAII) coding for a 175-kDa polypeptide that is similar in size and sequence to the acsAB gene product has been identified in Acetobacter xylinum AY201. Evidence for the presence of this gene was obtained during analysis of A. xylinum mutants in which the acsAB gene was disrupted (I.M. Saxena, K. Kudlicka, K. Okuda, and R.M. Brown, Jr., J. Bacteriol. 176:5735-5752, 1994). Although these mutants produced no detectable cellulose, they exhibited significant cellulose synthase activity in vitro. The acsAII gene was isolated by using an acsAB gene fragment as a probe. The acsAII gene coded for cellulose synthase activity as determined from sequence analysis and study of mutants in which this gene was disrupted. A mutant in which only the acsAII gene was disrupted showed no significant differences in either the in vivo cellulose production or the in vitro cellulose synthase activity compared with wild-type cells. Mutants in which both the acsAII and acsAB genes were disrupted produced no cellulose in vivo and exhibited negligible cellulose synthase activity in vitro, thus confirming that the cellulose synthase activity observed in the acsAB mutants was coded by the acsAII gene. These results establish the presence of an additional gene for cellulose synthase expressed in cells of A. xylinum, yet this gene is not required for cellulose production when cells are grown under laboratory conditions.

L5 ANSWER 11 OF 29 MEDLINE on STN DUPLICATE 17
ACCESSION NUMBER: 94364954 MEDLINE
DOCUMENT NUMBER: PubMed ID: 8083166
TITLE: Characterization of genes in the cellulose-synthesizing operon (acs operon) of Acetobacter xylinum: implications for cellulose crystallization.
AUTHOR: Saxena I M; Kudlicka K; Okuda K; Brown R M Jr
CORPORATE SOURCE: Department of Botany, University of Texas at Austin 78713-7640.
SOURCE: Journal of bacteriology, (1994 Sep) Vol. 176, No. 18, pp. 5735-52.
Journal code: 2985120R. ISSN: 0021-9193.
PUB. COUNTRY: United States
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
OTHER SOURCE: GENBANK-X54676
ENTRY MONTH: 199410
ENTRY DATE: Entered STN: 21 Oct 1994
Last Updated on STN: 21 Oct 1994
Entered Medline: 12 Oct 1994

AB The synthesis of an extracellular ribbon of cellulose in the bacterium Acetobacter xylinum takes place from linearly arranged, membrane-localized, cellulose-synthesizing and extrusion complexes that direct the coupled steps of polymerization and crystallization. To identify the different components involved in this process, we isolated an Acetobacter cellulose-synthesizing (acs) operon from this bacterium. Analysis of DNA sequence shows the presence of three genes in the acs operon, in which the first gene (acsAB) codes for a polypeptide with a molecular mass of 168 kDa, which was identified as the cellulose synthase. A single base change in the previously reported DNA

sequence of this gene, resulting in a frameshift and synthesis of a larger protein, is described in the present paper, along with the sequences of the other two genes (acsC and acsD). The requirement of the acs operon genes for cellulose production was determined using site-determined TnphoA/Kanr GenBlock insertion mutants. Mutant analysis showed that while the acsAB and acsC genes were essential for cellulose production in vivo, the acsD mutant produced reduced amounts of two cellulose allomorphs (cellulose I and cellulose II), suggesting that the acsD gene is involved in cellulose crystallization. The role of the acs operon genes in determining the linear array of intramembranous particles, which are believed to be sites of cellulose synthesis, was investigated for the different mutants; however, this arrangement was observed only in cells that actively produced cellulose microfibrils, suggesting that it may be influenced by the crystallization of the nascent glucan chains.

L5 ANSWER 12 OF 29 MEDLINE on STN DUPLICATE 19
ACCESSION NUMBER: 91358363 MEDLINE
DOCUMENT NUMBER: PubMed ID: 1653216
TITLE: An Acetobacter xylinum insertion sequence element associated with inactivation of cellulose production.
AUTHOR: Coucheron D H
CORPORATE SOURCE: Laboratory of Biotechnology, Norwegian Institute of Technology, University of Trondheim.
SOURCE: Journal of bacteriology, (1991 Sep) Vol. 173, No. 18, pp. 5723-31.
Journal code: 2985120R. ISSN: 0021-9193.
PUB. COUNTRY: United States
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 199110
ENTRY DATE: Entered STN: 27 Oct 1991
Last Updated on STN: 29 Jan 1999
Entered Medline: 9 Oct 1991

AB An insertion sequence (IS) element, IS1031, caused insertions associated with spontaneous cellulose deficient (Cel-) mutants of Acetobacter xylinum ATCC 23769. The element was discovered during hybridization analysis of DNAs from Cel- mutants of A. xylinum ATCC 23769 with pAXC145, an indigenous plasmid from a Cel- mutant of A. xylinum NRCC 17005. An IS element, IS1031B, apparently identical to IS1031, was identified on pAXC145. IS1031 is about 950 bp. DNA sequencing showed that the two elements had identical termini with inverted repeats of 24 bp containing two mismatches and that they generated 3-bp target sequence duplications. The A. xylinum ATCC 23769 wild type carries seven copies of IS1031. Southern hybridization showed that 8 of 17 independently isolated spontaneous Cel- mutants of ATCC 23769 contained insertions of an element homologous to IS1031. Most insertions were in unique sites, indicating low insertion specificity. Significantly, two insertions were 0.5 kb upstream of a recently identified cellulose synthase gene. Attempts to isolate spontaneous cellulose-producing revertants of these two Cel- insertion mutants by selection in static cultures were unsuccessful. Instead, pseudorevertants that made waxlike films in the liquid-air interface were obtained. The two pseudorevertants carried new insertions of an IS1031-like element in nonidentical sites of the genome without excision of the previous insertions. Taken together, these results suggest that indigenous IS elements contribute to genetic instability in A. xylinum. The elements might also be useful as genetic tools in this organism and related species.

L5 ANSWER 13 OF 29 MEDLINE on STN DUPLICATE 20
ACCESSION NUMBER: 91045951 MEDLINE

DOCUMENT NUMBER: PubMed ID: 2146681
TITLE: Genetic organization of the cellulose synthase operon in Acetobacter xylinum.
AUTHOR: Wong H C; Fear A L; Calhoon R D; Eichinger G H; Mayer R; Amikam D; Benziman M; Gelfand D H; Meade J H; Emerick A W; +
CORPORATE SOURCE: Department of Microbial Genetics, Cetus Corporation, Emeryville, CA 94608.
SOURCE: Proceedings of the National Academy of Sciences of the United States of America, (1990 Oct) Vol. 87, No. 20, pp. 8130-4.
Journal code: 7505876. ISSN: 0027-8424.
PUB. COUNTRY: United States
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
OTHER SOURCE: GENBANK-M37202
ENTRY MONTH: 199012
ENTRY DATE: Entered STN: 8 Feb 1991
Last Updated on STN: 8 Feb 1991
Entered Medline: 4 Dec 1990

AB An operon encoding four proteins required for bacterial cellulose biosynthesis (bcs) in Acetobacter xylinum was isolated via genetic complementation with strains lacking cellulose synthase activity. Nucleotide sequence analysis indicated that the cellulose synthase operon is 9217 base pairs long and consists of four genes. The four genes--bcsA, bcsB, bcsC, and bcsD--appear to be translationally coupled and transcribed as a polycistronic mRNA with an initiation site 97 bases upstream of the coding region of the first gene (bcsA) in the operon. Results from genetic complementation tests and gene disruption analyses demonstrate that all four genes in the operon are required for maximal bacterial cellulose synthesis in A. xylinum. The calculated molecular masses of the proteins encoded by bcsA, bcsB, bcsC, and bcsD are 84.4, 85.3, 141.0, and 17.3 kDa, respectively. The second gene in the operon (bcsB) encodes the catalytic subunit of cellulose synthase. The functions of the bcsA, bcsC, and bcsD gene products are unknown. Bacterial strains mutated in the bcsA locus were found to be deficient in cellulose synthesis due to the lack of cellulose synthase and diguanylate cyclase activities. Mutants in the bcsC and bcsD genes were impaired in cellulose production in vivo, even though they had the capacity to make all the necessary metabolic precursors and cyclic diguanylic acid, the activator of cellulose synthase, and exhibit cellulose synthase activity in vitro. When the entire operon was present on a multicopy plasmid in the bacterial cell, both cellulose synthase activity and cellulose biosynthesis increased. When the promoter of the cellulose synthase operon was replaced on the chromosome by E. coli tac or lac promoters, cellulose production was reduced in parallel with decreased cellulose synthase activity. These observations suggest that the expression of the bcs operon is rate-limiting for cellulose synthesis in A. xylinum.

L5 ANSWER 14 OF 29 AGRICOLA Compiled and distributed by the National Agricultural Library of the Department of Agriculture of the United States of America. It contains copyrighted materials. All rights reserved. (2006) on STN DUPLICATE 18
ACCESSION NUMBER: 94:3971 AGRICOLA
DOCUMENT NUMBER: IND20362873
TITLE: Incorporation of [14C]glucose into crystalline cellulose in aberrant fibers of a cotton mutant.
AUTHOR(S): Kohel, R.J.; Benedict, C.R.; Jividen, G.M.

AVAILABILITY: DNAL (64.8 C883)
SOURCE: Crop science, Sept/Oct 1993. Vol. 33, No. 5. p. 1036-1040
Publisher: Madison, Wis. : Crop Science Society of America, 1961-
CODEN: CRPSAY; ISSN: 0011-183X
NOTE: Includes references
PUB. COUNTRY: United States; Wisconsin
DOCUMENT TYPE: Article
FILE SEGMENT: U.S. Imprints not USDA, Experiment or Extension
LANGUAGE: English

AB Ligon lintless-1 is a dominant simply inherited mutant of cotton (Gossypium hirsutum L.) containing markedly short cotton fibers with extensively thickened secondary walk. The incorporation of [14C]glucose into Crystalline cellulose in the primary and secondary walls was studied to determine the relation between the extent of crystalline cellulose microfibril formation and the pattern of microfibril deposition to the aberrant growth and developmental pattern in the mutant cotton. The results show that the rate of crystalline cellulose formation in the primary walls of the mutant fibers correlates with the reduced rate of fiber elongation and primary wall formation. There is a five-fold increase in the rate of crystalline cellulose formed per millimeter of fiber length during secondary wall formation in the mutant fibers compared to the rate in the wild-type fibers. The Ligon lintless-1 gene mutation affects the growth and development of the cotton fibers with accompanying changes in the rate of formation of crystalline cellulose microfibrils in the primary and secondary walls. This increase in crystalline cellulose microfibrils in secondary walls is most likely due either to an increase in synthetic activity of the individual cellulose synthase complexes or to an increase in number of synthetic complex sites per unit of fiber length in the mutant .

L5 ANSWER 15 OF 29 JICST-EPlus COPYRIGHT 2006 JST on STN DUPLICATE 8
ACCESSION NUMBER: 990942649 JICST-EPlus
TITLE: Functional Domains in the Chitin Oligosaccharide Synthase NodC and Related B-Polysaccharide Synthases.
AUTHOR: KAMST E; SPAINK H P
CORPORATE SOURCE: Leiden Univ., Leiden, Nld
SOURCE: Trends Glycoscience Glycotechnology, (1999) vol. 11, no. 60, pp. 187-199. Journal Code: L1142A (Fig. 5, Ref. 53)
CODEN: TGGLEE; ISSN: 0915-7352
PUB. COUNTRY: Japan
DOCUMENT TYPE: Journal; General Review
LANGUAGE: Japanese; English
STATUS: New

AB Structure-comparisons of glycosyltransferases is hampered by the absence of extended sequence conservations. Only short regions of limited homology have been reported for groups of closely-related transferases such as the B-galactosyltransferase family, the sialyltransferases, and the B-polysaccharide synthases: a group of glycosyltransferases involved in the synthesis of linear polysaccharides that consist of B-linked saccharides. Examples of such enzymes are chitin synthase, cellulose synthase, hyaluronic acid synthase, and the bacterial NodC protein which synthesizes chitin oligosaccharides. In this paper we summarize the known functional aspects of this group of transferases, and possible links with structural aspects. We have found that all members contain six short sequences which are conserved throughout this family. Site-derected mutagenesis studies reported in literature have shown that the conserved residues in these conserved B-polysaccharide synthase regions are important, or even essential for enzyme activity. Since a detailed study of these mutants with regard to nucleotide-sugar binding or glycosyl acceptor binding has

not been reported, the data generated by these studies do not provide information about the precise roles of the conserved B-polysaccharide synthase regions in substrate-binding and catalysis. However, we report that a novel motif, conserved in all members of this B-polysaccharide synthase family, is homologous to known nucleotide-binding motifs in nucleoside-triphosphate-binding proteins. In addition we present a sequence analysis that indicates putative functions for the conserved regions in the B-polysaccharide synthase family in substrate-specificity, catalysis, and product chainlength control. (author abst.)

L5 ANSWER 16 OF 29 CABA COPYRIGHT 2006 CABI on STN DUPLICATE 9
ACCESSION NUMBER: 1999:56059 CABA
DOCUMENT NUMBER: 19990304360
TITLE: Enhancement of cellulose production [from medium containing 4% sucrose + 4% corn steep liquor] by expression of sucrose synthase in Acetobacter xylinum
AUTHOR: Nakai, T.; Tonouchi, N.; Konishi, T.; Kojima, Y.; Tsuchida, T.; Yoshinaga, F.; Sakai, F.; Hayashi, T.
CORPORATE SOURCE: Wood Research Institute, Kyoto University, Gokasho, Uji, Kyoto 611, Japan.
SOURCE: Proceedings of the National Academy of Sciences of the United States of America, (1999) Vol. 96, No. 1, pp. 14-18. 27 ref.
ISSN: 0027-8424
DOCUMENT TYPE: Journal
LANGUAGE: English
ENTRY DATE: Entered STN: 11 May 1999
Last Updated on STN: 11 May 1999

AB A mixture of sucrose synthase and bacterial cellulose synthase formed UDP-glucose from sucrose and UDP and synthesized 1,4-[beta]-glucan from the sugar nucleotide. The mutant sucrose synthase, which mimics phosphorylated sucrose synthase, enhanced the reaction efficiency (Vmax/Km) of 1,4-[beta]-glucan synthesis, in which the incorporation of glucose from sucrose was increased at low concentrations of UDP. When cultured in a medium containing 4% sucrose and 4% corn steep liquor, A. xylinum transformants expressing mutant sucrose synthase cDNA showed efficient formation of UDP-glucose from sucrose and a marked increase in cellulose production compared to transformants with wild-type sucrose synthase and untransformed bacteria. Although the level of UDP-glucose in the transformant with mutant sucrose synthase cDNA was only 1.6-fold higher than that in plasmid-free cells, the level of UDP was markedly lower in the transformant. It is concluded that sucrose synthase serves to channel carbon directly from sucrose to cellulose and recycles UDP, which prevents UDP build-up in cellulose biosynthesis.

L5 ANSWER 17 OF 29 CABA COPYRIGHT 2006 CABI on STN DUPLICATE 14
ACCESSION NUMBER: 1998:123867 CABA
DOCUMENT NUMBER: 19981608975
TITLE: Response: how many cellulose synthase-like gene products actually make cellulose?
AUTHOR: Arioli, T.; Burn, J. E.; Betzner, A. S.; Williamson, R. E.; Delmer, D. P.
CORPORATE SOURCE: Cooperative Research Centre for Plant Science, PO Box 475, Canberra, ACT 2601, Australia.
SOURCE: Trends in Plant Science, (1998) Vol. 3, No. 5, pp. 165-166. 6 ref.
DOCUMENT TYPE: Journal
LANGUAGE: English
ENTRY DATE: Entered STN: 13 Aug 1998

Last Updated on STN: 13 Aug 1998

AB This brief response to the article by Delmer [see Trends in Plant Science (1998) 3, 164-165] rejects the premature assignment of csl (cellulose synthase-like) gene functions to the biosynthesis of cellulose in studies with Arabidopsis mutants.

L5 ANSWER 18 OF 29 CABA COPYRIGHT 2006 CABI on STN DUPLICATE 15
ACCESSION NUMBER: 1998:89004 CABA
DOCUMENT NUMBER: 19981605980
TITLE: The molecular analysis of cell wall components
AUTHOR: Reiter, W. D.
CORPORATE SOURCE: Department of Molecular and Cell Biology, University of Connecticut, Storrs, CT 06269, USA.
SOURCE: Trends in Plant Science, (1998) Vol. 3, No. 1, pp. 27-32. 42 ref.
DOCUMENT TYPE: Journal
LANGUAGE: English
ENTRY DATE: Entered STN: 11 Jun 1998
Last Updated on STN: 11 Jun 1998

AB The cell walls of higher plants form a unique extracellular matrix that controls growth and developmental processes in the absence of cell migration. Biosynthesis of non-cellulosic cell wall polysaccharides involves (1) the formation of activated monosaccharides via nucleotide sugar interconversion pathways; (2) the translocation of these precursors from the cytosol into the lumen of the endomembrane system; and (3) synthesis of polysaccharides from the activated monomers via membrane-bound glycosyltransferases. The utility of Arabidopsis thaliana mutants has resulted in the identification of genes responsible for cellulose biosynthesis, e.g., trichome birefringence (tbr), and biosynthesis of polysaccharides other than cellulose, such as the murus (mur) genes.

L5 ANSWER 19 OF 29 BIOTECHNO COPYRIGHT 2006 Elsevier Science B.V. on STN DUPLICATE
ACCESSION NUMBER: 1998:28146820 BIOTECHNO
TITLE: Arabidopsis thaliana as a model system to study synthesis, structure, and function of the plant cell wall
AUTHOR: Reiter W.-D.
CORPORATE SOURCE: W.-D. Reiter, Dept. of Molec. and Cell Biology, Institute of Materials Science, University of Connecticut, 75 North Eagleville Road, Storrs, CT 06269, United States.
E-mail: wdreiter@uconnvm.uconn.edu
SOURCE: Plant Physiology and Biochemistry, (1998), 36/1-2 (167-176), 54 reference(s)
CODEN: PPBIEX ISSN: 0981-9428
DOCUMENT TYPE: Journal; Article
COUNTRY: France
LANGUAGE: English
SUMMARY LANGUAGE: English
AN 1998:28146820 BIOTECHNO
AB The cell wall of higher plants has been studied in numerous species using methods of carbohydrate chemistry, biochemistry and cell biology portraying the wall as a dynamic structure composed of highly complex polysaccharides and structural proteins encoded by multi-gene families. The recent discovery of proteins involved in cell wall loosening has provided opportunities to elucidate the mechanism of extension growth. Genetic tools have rarely been used to analyze the function of these proteins in vivo, or to identify genes involved in the synthesis of cell wall polysaccharides. It has recently been demonstrated that mutants with changes in cell wall composition can be isolated in Arabidopsis thaliana opening possibilities to clone genes involved in the

synthesis or modification of cell wall material via map-based approaches. The number of Arabidopsis mutants in cell wall synthesis is very limited, suggesting that novel screening procedures are required to come closer to the goal of saturating cell wall biosynthetic pathways. The availability of large numbers of expressed sequence tags in combination with collections of T-DNA and transposon-tagged Arabidopsis lines offers a considerable potential for the genetic characterization of cell wall-related genes which can be identified via database searches. The recent identification of Arabidopsis genes involved in the synthesis of cell wall precursors, and the discovery of plant homologs to bacterial cellulose synthases offer numerous and exciting possibilities for the genetic dissection of cell wall synthesis in higher plants using Arabidopsis thaliana as a model system.

L5 ANSWER 20 OF 29 CAPLUS COPYRIGHT 2006 ACS on STN DUPLICATE 10
ACCESSION NUMBER: 1998:157483 CAPLUS
DOCUMENT NUMBER: 128:201796
TITLE: Cellulose synthesis in the storage tissue of transgenic plants
INVENTOR(S): Nichols, Scott Edward; Singletary, George William
PATENT ASSIGNEE(S): Pioneer Hi-Bred International, Inc., USA
SOURCE: U.S., 5 pp.
CODEN: USXXAM
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 5723764	A	19980303	US 1995-475928	19950607 <--
PRIORITY APPLN. INFO.:			US 1995-475928	19950607

AB The present invention provides methods of synthesizing cellulose in the storage tissue of transgenic plants by introducing the cellulose biosynthetic enzymes into the storage tissue. Specifically, the genes for cellulose synthase (genes acsA, acsB, and acsC) and diguanylate cyclase from the species Acetobacter xylinium are introduced into a given plant under the control of storage tissue-specific promoters. Transit peptide sequences are included to target the cellulose synthase genes to the amyloplast or vacuole, diguanylate cyclase is targeted to the cytosol, and the promoters may be derived from 22-kDa zein, opaque2, γ-zein, and waxy genes. The plant may have been genetically engineered to diminish or abolish starch biosynthesis, such as the maize mutant genotypes sh2, bt2, and bt1.
REFERENCE COUNT: 13 THERE ARE 13 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L5 ANSWER 21 OF 29 CAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 2000:628277 CAPLUS
DOCUMENT NUMBER: 133:203813
TITLE: Method of modifying plant morphology, biochemistry or physiology using cdc25 substrates
INVENTOR(S): John, Peter Crook Lloyd
PATENT ASSIGNEE(S): Cropdesign N.V., Belg.; The Australian National University
SOURCE: PCT Int. Appl., 119 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 5
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE

WO 2000052172	A1	20000908	WO 2000-AU135	20000225 <--
W: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
RW: GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
CA 2263067	AA	20000826	CA 1999-2263067	19990226 <--
CA 2266295	AA	20000919	CA 1999-2266295	19990319 <--
AU 2000027860	A5	20000921	AU 2000-27860	20000225 <--
EP 1161541	A1	20011212	EP 2000-906072	20000225
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				

PRIORITY APPLN. INFO.:	US 1999-121870P	P 19990226
	US 1999-149049P	P 19990816
	WO 2000-AU135	W 20000225

AB The present invention provides a method for accelerating and increasing the production of biomass, branches, flowers and fruits, and for modifying one or more plant morphol., biochem. and physiol. properties or characteristics, such as one or more environmental adaptive responses and/or developmental processes of plants, by ectopically expressing therein a Cdc25 substrate or modified Cdc25 substrate, in particular a Cdc2 protein or a homolog, analog or derivative thereof. Thus, expression of Arabidopsis thaliana cdc2a from the patatin promoter in potato resulted in increased tuber size and number Addnl., in poplar, expression of cdc2a from the SAUR gene promoter increased lignin content, and, in lettuce, expression of cdc2a from the cab-6 or ubi7 promoters reduced leaf chlorosis and necrosis.

REFERENCE COUNT: 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L5 ANSWER 22 OF 29 CAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER:	2000:275595 CAPLUS
DOCUMENT NUMBER:	133:235105
TITLE:	Molecular biology of cellulose biosynthesis
AUTHOR(S):	Arioli, Tony; Burn, Joanne E.; Williamson, Richard E.
CORPORATE SOURCE:	Plant Cell Biology Group, Australian National University, Australia
SOURCE:	Forestry Sciences (Dordrecht, Netherlands) (2000), 64(Molecular Biology of Woody Plants, Vol. 1), 205-225 CODEN: FOSCEH; ISSN: 0924-5480
PUBLISHER:	Kluwer Academic Publishers
DOCUMENT TYPE:	Journal; General Review
LANGUAGE:	English

AB Recent breakthroughs in cellulose biosynthesis are reviewed with many refs. Progress has been made in the identification of candidate genes and the use of a single mutant to clearly show gene function. Genetic approaches using Arabidopsis mutants offer opportunities to identify further genes required for cellulose synthesis, and would be complementary to any advancement in the study of in vitro synthesis of cellulose. The rapidly accumulating sequence data pointing to a large and complex gene family in plants presents the challenge of defining members that encode the cellulose synthase catalytic subunit, and potentially, proteins that synthesize other polysaccharides.

REFERENCE COUNT: 75 THERE ARE 75 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L5 ANSWER 23 OF 29 CAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2001:217556 CAPLUS
DOCUMENT NUMBER: 136:1152
TITLE: Higher plant cellulose synthases
AUTHOR(S): Richmond, Todd
CORPORATE SOURCE: Dep. Plant Biology, Carnegie Institution Washington, Stanford, CA, 94305, USA
SOURCE: GenomeBiology [online computer file] (2000), 1(4), No pp. given
CODEN: GNBLFW; ISSN: 1465-6914
URL: http://www.genomebiology.com/retriever.asp?url=/2000/1/4/reviews/3001
PUBLISHER: BioMed Central Ltd.
DOCUMENT TYPE: Journal; General Review; (online computer file)
LANGUAGE: English
AB A review with refs. described cellulose synthase gene in plant. Cellulose, an aggregate of unbranched polymers of -1,4-linked glucose residues, is the major component of wood and thus paper, and is synthesized by plants, most algae, some bacteria and fungi,and even some animals. The genes that synthesize cellulose in higher plants differ greatly from the well-characterized genes found in Acetobacter and Agrobacterium sp. More correctly designated as cellulose synthase catalytic subunits, plant cellulose synthase (CesA) proteins are integral membrane proteins, approx. 1,000 amino acids in length. The sequences for more than 20 full-length CesA genes are available, and they show high similarity to one another across the entire length of the encoded protein, except for two small regions of variability. There are a number of highly conserved residues, including several motifs shown to be necessary for processes glycosyltransferase activity. No-crystal structure is known for cellulose synthase proteins, and the exact enzymic mechanism is unknown. There are a number of mutations in cellulose synthase genes in the model organism Arabidopsis thaliana. Some of these mutants show altered morphol. due to the lack of a properly developed primary or secondary cell wall. Others show resistance to well characterized cellulose biosynthesis inhibitors.
REFERENCE COUNT: 12 THERE ARE 12 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L5 ANSWER 24 OF 29 CAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 1999:678189 CAPLUS
DOCUMENT NUMBER: 131:309854
TITLE: Enzymic preparation of UDP-glucose and cellulose from sucrose with plant sucrose synthetase mutant and microbial cellulose synthase
INVENTOR(S): Hayashi, Takahisa; Sotouchi, Naoto
PATENT ASSIGNEE(S): Kyoto University, Japan; Bio Polymer Research K. K.
SOURCE: Jpn. Kokai Tokkyo Koho, 5 pp.
CODEN: JKXXAF
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 11290075	A2	19991026	JP 1998-62316	19980226 <--
PRIORITY APPLN. INFO.:			JP 1998-62316	19980226

AB Described are a method for the production of UDP-glucose from sucrose with a mutant sucrose synthetase of mung bean and a method for the preparation of cellulose from sucrose in the presence of the sucrose synthetase mutant and cellulose synthase of Acetobacter xylinum. The process significantly improves the yield of cellulose.

L5 ANSWER 25 OF 29 CAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 1998:59060 CAPLUS
DOCUMENT NUMBER: 128:124532
TITLE: Cellulose synthase genes for the manipulation of cellulose and/or β-1,4-glucan in plants
INVENTOR(S): Arioli, Antonio; Williamson, Richard Edward; Betzner, Andreas Stefan; Peng, Liangcai
PATENT ASSIGNEE(S): Australian National University, Australia; Commonwealth Scientific and Industrial Research Organisation; Arioli, Antonio; Williamson, Richard Edward; Betzner, Andreas Stefan; Peng, Liangcai
SOURCE: PCT Int. Appl., 207 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 9800549	A1	19980108	WO 1997-AU402	19970624 <--
W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
RW: GH, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG				
CA 2259126	AA	19980108	CA 1997-2259126	19970624 <--
AU 9731603	A1	19980121	AU 1997-31603	19970624 <--
AU 720423	B2	20000601		
ZA 9705589	A	19980610	ZA 1997-5589	19970624 <--
BR 9710696	A	19990817	BR 1997-10696	19970624 <--
EP 956353	A1	19991117	EP 1997-926920	19970624 <--
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI				
JP 2001510326	T2	20010731	JP 1998-503665	19970624
US 6495740	B1	20021217	US 1998-221013	19981223
US 2003126643	A1	20030703	US 2002-229193	20020826

PRIORITY APPLN. INFO.:
AU 1996-699 A 19960627
WO 1997-AU402 W 19970624
US 1998-221013 A1 19981223

AB The present invention relates generally to isolated genes which encode polypeptides involved in cellulose biosynthesis in plants and transgenic plants expressing same in sense or antisense orientation, or as ribozymes, co-suppression or gene-targeting mols. More particularly, the present invention is directed to a nucleic acid mol. isolated from Arabidopsis thaliana, Oryza sativa, wheat, barley, Brassica ssp., Gossypium HI, and Eucalyptus ssp. which encode an enzyme which important in cellulose biosynthesis, in particular the cellulose synthase enzyme and homologs, analogs and derivs. thereof and uses of same in the production of transgenic plants expressing altered cellulose biosynthetic properties. Thus, the RSW1 gene encoding the catalytic subunit of a cellulose synthase was isolated and sequenced from Arabidopsis thaliana, as well as the full-length cDNA and the sequences for several related clones and a rsw1 mutant of A. thaliana. Antisense expression of RSW1 in transgenic plants reproduces some of the phenotype of rsw1 with regard to altered cellulose and β-1,4-glucan contents.

REFERENCE COUNT: 3 THERE ARE 3 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L5 ANSWER 26 OF 29 CAPLUS COPYRIGHT 2006 ACS on STN
ACCESSION NUMBER: 1991:600336 CAPLUS
DOCUMENT NUMBER: 115:200336
TITLE: The cellulose synthase operon of Acetobacter: cloning and expression
INVENTOR(S): Ben-Bassat, Arie; Calhoon, Roger D.; Fear, Anna Lisa; Gelfand, David H.; Meade, James H.; Tal, Rony; Wong, Hing; Bensiman, Moshe
PATENT ASSIGNEE(S): Cetus Corp., USA
SOURCE: PCT Int. Appl., 113 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 2
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 9012098	A2	19901018	WO 1990-US1811	19900404 <--
WO 9012098	A3	19910530		
W: AU, FI, JP, NO				
RW: AT, BE, CH, DE, DK, ES, FR, GB, IT, LU, NL, SE				
AU 9054373	A1	19901105	AU 1990-54373	19900404 <--
EP 471687	A1	19920226	EP 1990-906539	19900404 <--
EP 471687	B1	19971210		
R: AT, BE, CH, DE, DK, ES, FR, GB, IT, LI, LU, NL, SE				
JP 07073500	B4	19950809	JP 1990-506168	19900404 <--
AT 161049	E	19971215	AT 1990-906539	19900404 <--
ES 2111536	T3	19980316	ES 1990-906539	19900404 <--
IL 94053	A1	20010430	IL 1990-94053	19900409
CA 2014264	AA	19901012	CA 1990-2014264	19900410 <--
CA 2014264	C	19990511		
US 5268274	A	19931207	US 1991-689008	19910422 <--

PRIORITY APPLN. INFO.:

US 1989-337194	A	19890412
US 1990-496236	A	19900323
WO 1990-US1811	A	19900404
IL 1990-94053	A	19900409
CA 1990-2014264	A	19900410
IE 1990-1317	A	19900411
NZ 1990-233312	A	19900412

AB The cellulose synthase operon of Acetobacter, containing genes encoding cellulose synthase A, B, C, and D, is cloned and expressed and its DNA sequence given. The cellulose synthase B gene was cloned in Acetobacter mutant (Cel-) from a library of Acetobacter 1306-3 in the cosmid pKT230Cos 5 by complementation. Then, based on the cellulose B sequence, the complete sequence for the operon was cloned into plasmid pABCD and sequenced. Expression of the operon in Acetobacter from the endogenous promoter and exogenous promoters such as lac and tac promoter was demonstrated. The purification and characterization of the cellulose synthase by SDS-PAGE and N-terminal amino acid sequence anal. were also described.

L5 ANSWER 27 OF 29 LIFESCI COPYRIGHT 2006 CSA on STN
ACCESSION NUMBER: 1999:1727 LIFESCI
TITLE: A hot mutant for cellulose synthesis
AUTHOR: Delmer, D.P.
CORPORATE SOURCE: Section of Plant Biology, University of California (Davis), One Shields Ave., Davis, CA 95616, USA
SOURCE: Trends Plant Sci., (19980500) vol. 3, no. 5, pp. 164-165.
ISSN: 1360-1385.
DOCUMENT TYPE: Journal

TREATMENT CODE: General Review
FILE SEGMENT: G
LANGUAGE: English
SUMMARY LANGUAGE: English

AB Despite remarkable progress in the study of cellulose biosynthesis in recent years, biochemical approaches in plants have been largely unsuccessful. This position has recently altered, with Arioli et al. reporting in the journal Science on the functional characterization of a plant gene that shares homology with (and encodes a similar protein to) bacterial genes for the catalytic subunit of the cellulose synthases. For the plant, the pattern in which cellulose is deposited in the primary cell wall determines to a great extent the pattern of cell expansion. Similarly, the pattern and extent of often massive deposition in secondary walls contributes unique form and function to specialized cells, as well as serving to provide strength without excessive brittleness to the plant. Understanding cellulose synthesis is also important because cellulose, with its great abundance and unique structure, is a polymer of immense commercial value. Acetobacter xylinum as a model system. Those of us working on cellulose synthesis in plants looked on with some envy in the past decade as rapid progress was made with Acetobacter xylinum, a gram-negative bacterium that secretes a tangled mat of cellulosic microfibrils (a pellicle). Since 1987, this progress has included identification of cyclic di-GMP (c-di-GMP) as a unique activator of the process; synthase purification and identification of the catalytic subunit; and cloning of an operon of genes, the first of which is known to encode the catalytic subunit. Unfortunately, these substantial achievements did not immediately open the way to similar advances with plants. Rates of cellulose synthesis remained low in most in vitro systems and, disappointingly, were not stimulated by addition of c-di-GMP. Furthermore, use of the sequence of the A. xylinum catalytic subunit to probe plant cDNA libraries was unsuccessful, with no homologous genes identified. This suggested that the plant genes were either very different or, at best, only homologous in limited, conserved regions. In 1995, a breakthrough occurred with the identification of four motifs three centered around regions that each contain an aspartate residue, and the fourth with the sequence QxxRW.

L5 ANSWER 28 OF 29 SCISEARCH COPYRIGHT (c) 2006 The Thomson Corporation on STN

ACCESSION NUMBER: 2000:648028 SCISEARCH
THE GENUINE ARTICLE: 346CY
TITLE: The eli1 mutation reveals a link between cell expansion and secondary cell wall formation in Arabidopsis thaliana
AUTHOR: Cano-Delgado A I; Metzlaff K; Bevan M W (Reprint)
CORPORATE SOURCE: John Innes Inst, Dept Mol Genet, Norwich Res Pk, Colney Lane, Norwich NR4 7UH, Norfolk, England (Reprint); John Innes Inst, Dept Mol Genet, Norwich NR4 7UH, Norfolk, England
COUNTRY OF AUTHOR: England
SOURCE: DEVELOPMENT, (AUG 2000) Vol. 127, No. 15, pp. 3395-3405.
ISSN: 0950-1991.
PUBLISHER: COMPANY OF BIOLOGISTS LTD, BIDDER BUILDING CAMBRIDGE COMMERCIAL PARK COWLEY RD, CAMBRIDGE CB4 4DL, CAMBS, ENGLAND.
DOCUMENT TYPE: Article; Journal
LANGUAGE: English
REFERENCE COUNT: 29
ENTRY DATE: Entered STN: 2000
Last Updated on STN: 2000

ABSTRACT IS AVAILABLE IN THE ALL AND IALL FORMATS

AB Mutants with altered patterns of lignification have been identified in a population of mutagenised Arabidopsis seedlings. One of

the mutants exhibited ectopic lignification (eli) of cells throughout the plant that never normally lignify. The reduced expansion of eli1 cells resulted in a stunted phenotype, and xylem cells were misshapen and failed to differentiate into continuous strands, causing a disorganized xylem, Analysis of phenotypes associated with double mutants of eli1 lit (lion's tail), a cell expansion mutant , indicated that the primary defect in eli1 plants may be inappropriate initiation of secondary wall formation and subsequent aberrant lignification of cells caused by altered cell expansion. Related ectopic lignification phenotypes were also observed in other cell expansion mutants, suggesting a mechanism that senses cell size and controls subsequent secondary wall formation. Interactions between eli1 and wol (woodenleg), a mutant altering xylem cell specification, revealed a role for ELI1 in promoting formation of continuous xylem strands, and demonstrated that ELI1 functions during cell elongation zone in the primary root and other tissues.

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ACCESSION NUMBER: 2000:505015 SCISEARCH
THE GENUINE ARTICLE: 328UJ
TITLE: A xylem-specific cellulose synthase gene from aspen (Populus tremuloides) is responsive to mechanical stress
AUTHOR: Wu L G; Joshi S P; Chiang V L (Reprint)
CORPORATE SOURCE: Michigan Technol Univ, Sch Forestry & Wood Prod, Plant Biotechnol Res Ctr, Houghton, MI 49931 USA (Reprint)
COUNTRY OF AUTHOR: USA
SOURCE: PLANT JOURNAL, (JUN 2000) Vol. 22, No. 6, pp. 495-502.
ISSN: 0960-7412.
PUBLISHER: BLACKWELL SCIENCE LTD, P O BOX 88, OSNEY MEAD, OXFORD OX2 0NE, OXON, ENGLAND.
DOCUMENT TYPE: Article; Journal
LANGUAGE: English
REFERENCE COUNT: 33
ENTRY DATE: Entered STN: 2000
Last Updated on STN: 2000

ABSTRACT IS AVAILABLE IN THE ALL AND IALL FORMATS

AB Angiosperm trees accumulate an elevated amount of highly crystalline cellulose with a concomitant decrease in lignin in the cell walls of tension-stressed tissues. To investigate the molecular basis of this tree stress response, we cloned a full-length cellulose synthase (PtCesA) cDNA from developing xylem of aspen (Populus tremuloides). About 90% sequence similarity was found between the predicted PtCesA and cotton GhCesA proteins. Northern blot and in situ hybridization analyses of PtCesA gene transcripts in various aspen tissues, and PtCesA gene promoter-beta-glucuronidase (GUS) fusion analysis in transgenic tobacco, demonstrated conclusively that PtCesA expression is confined to developing xylem cells during normal plant growth. During mechanical stress induced by stem bending, GUS expression remained in xylem and was induced in developing phloem fibers undergoing tension stress, but was turned off in tissues undergoing compression on the opposite side of the bend. Our results suggest a unique role for PtCesA in cellulose biosynthesis in both tension-stressed and normal tissues in aspen, and that the on/off control of PtCesA expression may be a part of a signaling mechanism triggering a stress-related compensatory deposition of cellulose and lignin that is crucial to growth and development in trees.

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1. The cellulose synthase gene of Dictyostelium.
R L Blanton / D Fuller / N Iranfar / M J Grimson / W F Loomis, *Proc Natl Acad Sci U S A*, Feb 2000
...isolated insertional **mutants** that failed to accumulate cellulose and had no **cellulose synthase** activity at any stage...normally in the null **mutants** up to the beginning of...were ever made in the **mutants**, with all cells eventually...
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2. Plant cell expansion : scaling the wall [PDF-23K]
Jun 2000
...obtained from two cell wall **mutants** that encode a **cellulose synthase** subunit and an unusual...discuss other cell expansion **mutants** with potential wall defects and the importance of **cellulose synthase**-like genes. A **cellulose**...
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3. PROCUSTE1 encodes a cellulose synthase required for normal cell elongation specifically in roots and dark-grown hypocotyls...
M Fagard / T Desnos / T Desprez / F Goubet / G Refregier / G Mouille / M McCann / (...) / H Höfte, *Plant Cell*, Dec 2000
Mutants at the PROCUSTE1 (PRC1) locus show decreased cell elongation...cloning of PRC1 reveals that it encodes a member (CesA6) of the **cellulose synthase** catalytic subunit family, of which at least nine other members...requires the coordinated expression of at least two distinct **cellulose synthase** isoforms.
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4. Identification of a second cellulose synthase gene (acsAII) in Acetobacter xylinum.
I M Saxena / R M Brown, *J Bacteriol*, Sep 1995
...Although these **mutants** produced no detectable...exhibited significant **cellulose**

synthase activity in vitro...or the in vitro **cellulose synthase** activity compared...wild-type cells. **Mutants** in which both...confirming that the **cellulose synthase** activity observed in the acsAB **mutants** was coded by the...

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☐ **5.** Cell wall mutants
Fagard, M. / Hofte, H. / Vernhettes, S., *Plant Physiology and Biochemistry*, Jan 2000
...large collection of **mutants** with altered monosaccharide...Table I Arabidopsis **mutants** affected in cell wall...stems Not reported 1 **Cellulose synthase**-like [56] cyt1 Incomplete...all organs affected 3 **Cellulose synthase** catalytic subunit...silique Fruits of double **mutants** do not dehisce 1 MADS...
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☐ **6.** PROCUSTE1 Encodes a Cellulose Synthase Required for Normal Cell Elongation Specifically in Roots and Dark-Grown Hypocotyls...
Fagard, Mathilde / Desnos, Thierry / Desprez, Thierry / Goubet, Florence / Refregier, Guislaine / Mouille, Gregory / McCann, Maureen / (...) / HÃÂ¶fte, Herman, *The Plant Cell*, Jan 1999
Mutants at the PROCUSTE1 (PRC1) locus show decreased cell elongation...cloning of PRC1 reveals that it encodes a member (CesA6) of the **cellulose synthase** catalytic subunit family, of which at least nine other members...requires the coordinated expression of at least two distinct **cellulose synthase** isoforms.
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Roberts, K. / McCann, M.C., *Current Opinion in Plant Biology*, Dec 2000
...lignification A range of xylem **mutants** in Arabidopsis has...XYLEM 3 locus encodes a **cellulose synthase** that is required to...to emerge as other **mutants** from this screen are...other cell-expansion **mutants** display ectopic lignification...walls. A xylem-specific **cellulose synthase** from poplar has been...
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☐ **8.** PLANT CELLULOSE SYNTHASE GENES
TURNER, Simon / TAYLOR, Neil / THE VICTORIA UNIVERSITY OF MANCHESTER, *PATENT COOPERATION TREATY APPLICATION*, Nov 2000
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Nicol, F. / Hofte, H., *Current Opinion in Plant Biology*, Feb 1998
...obtained from two cell wall **mutants** that encode a **cellulose synthase** subunit and an unusual...discuss other cell expansion **mutants** with potential wall defects and the importance of **cellulose synthase**-like genes. A **cellulose**...
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Srinivasan, S. / Alexander, H. / Alexander, S., *Trends in Cell Biology*, Aug 2000
...migrating slug. Dictyostelium has a single **cellulose synthase** gene. **Mutants** lacking this gene do not contain cellulose...Cell Biol. 10 2000 215 219 3 Blanton R.L. The **cellulose synthase** gene of Dictyostelium Proc. Natl. Acad. Sci...
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Gary J. Quigley, Mar 2000
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☐ **12.** ...response: How many cellulose synthase-like gene products actually make cellulose?
Arioli, T. / Burn, J.E. / Betzner, A.S. / Williamson, R.E., *Trends in Plant Science*, May 1998
...response: How many **cellulose synthase**-like gene products...analysis of Arabidopsis **mutants**, we linked a defined...predict that a csl (`**cellulose synthase**-like') gene is involved...Arabidopsis csl (`**cellulose synthase**-like') genes. The...
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☐ **13.** Cellulose synthases and related enzymes
Saxena, I.M. / Brown Jr, R.M., *Current Opinion in Plant Biology*, Dec 2000
...Genetic analyses of these **mutants** present the best evidence of the identity of **cellulose synthase** genes in plants. Genomic...as the analysis of **mutants**, have led to the identification...cellulose synthases and **cellulose synthase**-like proteins. These...
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☐ **14.** METHODS AND NUCLEIC ACID SEQUENCES FOR THE EXPRESSION OF THE CELLULOSE SYNTHASE OPERON
BEN-BASSAT, Arie / CALHOON, Roger, D. / FEAR, Anna, Lisa / GELFAND, David, H. / MEADE, James, H. / TAL, Rony / WONG, Hing / (...) / MONSANTO COMPANY, *EUROPEAN PATENT*, Feb 1992
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☐ **15.** METHODS AND NUCLEIC ACID SEQUENCES FOR THE EXPRESSION OF THE CELLULOSE SYNTHASE OPERON
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synthase reaction. Attempts to purify **cellulose**...
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...encoding the bacterial **cellulose synthase** operon employ a number...capable of restoring **cellulose synthase** activity in the Cel'- Acetobacter **mutants** (5) mapping and subcloning...encoding the bacterial **cellulose synthase** operon for both sequence...
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☐ **17.** Cellulose microfibrils in plants: biosynthesis, deposition, and integration into the cell wall.

C T Brett, *Int Rev Cytol*, Feb 2000
...linked intermediates. **Cellulose synthase** has been purified from...In plants, disrupted **cellulose synthase** may form callose. **Cellulose synthase** genes have been isolated...plants. Cellulose-deficient **mutants** have been characterised...

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T Richmond, *Genome Biol*, Feb 2000
...subunits', plant **cellulose synthase** (CesA) proteins are...structure is known for **cellulose synthase** proteins, and the...number of mutations in **cellulose synthase** genes in the model...thaliana. Some of these **mutants** show altered morphology...

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☐ **19.** Cementing the wall: cell wall polysaccharide synthesising enzymes
Reid, J.G., *Current Opinion in Plant Biology*, Dec 2000
...polysaccharides. CeSA **cellulose synthase** HG homogalacturonan...similar to that of **cellulose synthase**, which has remained...analysis of cell-wall **mutants** [26] . New data...evidence that plant **cellulose synthase** (CeSA) genes...

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H C Wong / A L Fear / R D Calhoon / G H Eichinger / R Mayer / D Amikam / M Benziman / (...) / A W Emerick, *Proc Natl Acad Sci U S A*, Oct 1990
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M Fagard, T Desnos, T Desprez, F Goubet, G ... - The Plant Cell Online, 2000 - plantcell.org
... the sequence similarity and the **cellulose** deficiency of prc1 **mutants** provide strong evidence that CesA6 encodes another **cellulose synthase** catalytic subunit. ...
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NG Taylor, S Laurie, SR Turner - Plant Cell, 2000 - intl.plantcell.org
... subunit of the higher plant **cellulose synthase** complex (Pear et al. 1996). This was confirmed by genetic analysis of Arabidopsis **mutants** deficient in ...
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